UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

E/CN.17/1995/18
24 March 1995

ORIGINAL: ENGLISH

COMMISSION ON SUSTAINABLE DEVELOPMENT
Third session
11-28 April 1995
Item 3 of the provisional agenda*

GENERAL DISCUSSION OF PROGRESS IN THE IMPLEMENTATION OF AGENDA 21, FOCUSING ON THE CROSS-SECTORAL COMPONENTS OF AGENDA 21 AND THE CRITICAL ELEMENTS OF SUSTAINABILITY

Information for decision-making and Earthwatch

Report of the Secretary-General

SUMMARY

Chapter 40 of Agenda 21 1/ is concerned with improving the content, format and accessibility of information for decision makers at all levels, from the national and international levels to the grass-roots and individual ones. This, in turn, requires a continuing emphasis on developing the capabilities to collect, analyse, apply and disseminate data at national and local levels. A number of important issues surrounding information strategies are discussed in the present report, from improving data assessment and analysis, and standards and meta-information, to networking.

Among the issues addressed are four regarding which specific proposals are made for further and immediate action. These include a programme of work for indicators for sustainable development; the United Nations system-wide Earthwatch; the establishment of a complementary Development Watch; and development of a common or compatible system of access to United Nations system-wide databases. Proposals for action are contained in paragraphs 95-98.

* E/CN.17/1995/1.

95-05791 (E) 070495 100495

/...

CONTENTS

		Paragraphs	Page
INTRODUCTION		1 - 13	3
	A. Stages of decision-making	4 - 11	3
	B. The users of information	12 - 13	5
I.	GENERAL OVERVIEW OF STATUS AND PROBLEMS	14 - 18	5
II.	REVIEW OF PROGRESS ACHIEVED, MAIN POLICY ISSUES AND EXPERIENCES	19 - 66	6
	A. Indicators for sustainable development	19 - 32	6
	B. Data collection and use	33 - 49	9
	1. United Nations system-wide Earthwatch	37 - 42	11
	2. Development Watch	43 - 49	12
	C. Improvement of methods of data assessment and analysis	50 - 59	13
	D. Establishment of a comprehensive information framework	60 - 62	16
	E. Strengthening the capacity for traditional information	63 - 66	16
III.	IMPROVING THE AVAILABILITY OF INFORMATION	67 - 94	17
	A. Production of information usable for decision-making	67 - 77	17
	B. Standards and methods for handling information	78 - 81	20
	C. Development of documentation about information	82 - 84	20
	D. Establishment and strengthening of electronic networking capabilities	85 - 91	21
	E. Making use of commercial information sources	92 - 94	22
IV.	CONCLUSIONS AND PROPOSALS FOR ACTION	95 - 98	23

Annexes

I.	Programme of work on indicators for sustainable development	25
II.	United Nations system-wide Earthwatch	40

INTRODUCTION

1. Chapter 40 of Agenda 21, 1/ entitled "Information for decision-making", addresses the subject over a broad range of activities. One of these activities is the United Nations system-wide Earthwatch, itself a complex and comprehensive information system for the environment. The task managers for chapter 40 and Earthwatch, the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat and the United Nations Environment Programme (UNEP) respectively, agreed to combine their efforts and produce a single report covering both information for decision-making and Earthwatch. This decision was endorsed by an Inter-agency Earthwatch Working Party in June 1994.

2. The discussion contained in the present report results from inputs provided by national Governments, the relevant organizations of the United Nations system, and a number of non-governmental organizations. In addition, the Department for Policy Coordination and Sustainable Development expresses its gratitude to the organizers of six workshops that helped to elucidate some of the issues addressed in chapter 40 of Agenda 21, namely (a) the Earthwatch Working Party, organized by UNEP (Geneva, 1 and 2 June 1994); (b) the United Nations Development Programme (UNDP) Consultative Forum on the Application of Information Systems and Technology to Sustainable Human Development (New York, 24 and 25 May 1994); (c) the Informal Consultation on Environment, Development and Information, organized by the International Development Research Centre (IDRC) of Canada (Ottawa, Canada, 11 and 12 April 1994); (d) the Workshop on Indicators, organized by the World Bank (Washington, D.C., 22 and 23 September 1994); (e) the Expert Group Meeting on Development Watch, organized jointly by the Department for Policy Coordination and Sustainable Development and UNDP (New York, 15 and 16 December 1994); and (f) the Workshop on Indicators organized by the Governments of Belgium and Costa Rica, UNEP and the Scientific Committee on Problems of the Environment (SCOPE) (Ghent, Belgium, 9-11 January 1995). The Expert Group Meeting on Indicators for Sustainable Development, organized by the Department for Policy Coordination and Sustainable Development of the Secretariat on 14 and 15 February 1995, also contributed to the discussions and proposals contained in this report.

3. In reviewing this report, it is also important to keep in mind that the collection, handling and dissemination of information together constitute an important part of all of the chapters of Agenda 21. Consequently, attention is drawn to all of the thematic reports to the Commission providing additional treatment of these issues.

A. Stages of decision-making

4. Chapter 40 of Agenda 21 acknowledges that "everyone is a user and provider of information considered in the broad sense". Moreover, it notes that decision makers exist at all levels, from "the national and international levels to the grass-roots and individual levels". It stresses the need to bridge the "data gap" and to improve the availability of information through several activities designed to improve each step of the decision-making process (para. 40.1).

5. Decision-making is a cyclical process, with decisions engendering certain actions, the results of which feed back into new decisions. In general, this process is considered to involve five steps: (a) problem identification; (b) policy formulation; (c) implementation; (d) performance monitoring; and (e) evaluation. One does not move "up" from one step to the other, with a finite destination. The process is a loop, and each function may be viewed as an entry point.

6. The information required will vary with the nature of the decisions to be taken. Needs for each step may differ in some other respects as well. Problem identification requires scientific and technical data and the methodologies for their collection and interpretation. Those data will be drawn from performance monitoring and evaluation activities, as well as from other sources. For this purpose, performance monitoring evaluation, and problem identification may be viewed in tandem.

7. Policy formulation is likely to require additional data, related, for example, to the social, economic, technological and cultural conditions in a country. Technology assessment for potential solutions and other methodologies for assessment and forecasting are important here. Above all, policy formulation presupposes the existence of a strategy with objectives towards which the policies are directed.

8. Implementation depends upon information about local site conditions, including the actors who will assist in the implementation. Representation of major groups is particularly important as ensuring channels of information both from and to people at the grass-roots level.

9. Continuing performance monitoring and evaluation will show whether the policy and its implementation are effective and suggest where further problem identification and policy formulation are required.

10. Capacity-building efforts are crucial to all stages of decision-making. These include training in the collection, handling and use of data, as well as in assessment and other analytical techniques; establishing internal databases and information systems and linking them with external systems, as relevant; designing mechanisms for involving all major groups both as providers and as users of information; and creating the institutional support to sustain all of these functions.

11. All of the producers of information are also potential users. Decision makers at local and national levels, major groups and international organizations all communicate across levels as well as within them, for different purposes. Inputs may differ as outputs or targets vary, but this is not necessarily the case. The fact that in the past information supply, and not demand, has been emphasized highlights the present need for both information brokers and demand-driven information.

B. The users of information

12. The concept of "users" of information is a broader one than that of "decision makers", although all users generally seek information in order to make decisions. Chapter 40 of Agenda 21 addresses itself primarily to decision makers at the national political level, but other users are also important. Within a country, users may include the following:

(a) Economic planners within the central Government, who rely primarily on macroeconomic information that is provided by other government ministries and the national bureau of statistics;

(b) Sectoral ministries, public enterprises, and public agencies that usually rely on information collected nationally, through ministerial networks, and on data from international sources. Integration of the data may be difficult because of a lack of standardization and assessment methodologies;

(c) Researchers and analysts in universities, research institutions and similar non-governmental organizations, who represent an important source of analysis and modelling, and can function as technical information brokers for political decision makers;

(d) Private sector institutions and enterprises, which need very specific information and usually seek it through private means;

(e) Local-level data users, including major groups and their representative organizations, whose needs vary from data on weather and land use to microeconomic trends;

(f) Bilateral and multilateral institutions, which have needs for national-level-related information ranging from macroeconomic data to project-specific information.

13. Bilateral and multilateral institutions, including both intergovernmental and non-governmental organizations, also have a need to exchange information among themselves, in order to increase harmonization and standardization and to profit from each other's experience with project design and implementation. This issue is addressed below under "Networks".

I. GENERAL OVERVIEW OF STATUS AND PROBLEMS

14. Based on an analysis of the work done since the United Nations Conference on Environment and Development on information for decision-making, particularly in the context of the in-depth study of Earthwatch, it appears that many of the elements for an effective information system for decision-making on environment and sustainable development are in place or are being developed at the international level. Considerable progress has also been made at the national level, through the efforts of Governments, the private sector, non-governmental organizations and the United Nations system. This work needs, however, to be expanded and strengthened, and, in general, better linked at all levels.

15. Continuing emphasis must be placed not only on access to data, but also on developing the capabilities to collect, analyse, apply and disseminate data at the national and local levels. The national reports indicate that one of the more comprehensive ways in which countries are trying to address these issues is by developing national strategies or policies for sustainable development information, often within the context of national sustainable development strategies.

16. What also needs to be completed is the assembling of the various elements in a coherent process that moves information quickly from initial data collection (generally by Governments), through compilation and assessment, to delivery in forms decision makers can use. The mechanisms that have been established to do this - including the efforts by Pakistan, Switzerland, Turkey and Uganda to create comprehensive information frameworks at the national level, and the use of indicators by the United Kingdom of Great Britain and Northern Ireland and the United States of America, for example, to help define a framework - are discussed in this report.

17. The "information revolution" in new technologies such as electronic networks and computer imagery will make possible flows and uses of information that would have been inconceivable even a few years ago. There is in fact a danger of information overload, as the ability to collect and communicate information exceeds the ability to absorb and understand it.

18. Decision makers may not have the technical training to allow them to use information from scientific, technical or statistical sources in the most productive manner. They are likely to rely on an adviser who interprets the information for them. This requires a careful reconsideration of the information-supply process, as regards producing the critical elements from the assessment process in forms that can be understood and utilized. Indicators are one approach to this problem. Another is the use of "information brokers", to help interpret, manage, filter and add value to the flood of available information. The information broker is a facilitator who can raise awareness about what is available, and at what costs and for what purpose.

II. REVIEW OF PROGRESS ACHIEVED, MAIN POLICY ISSUES AND EXPERIENCES

A. Indicators for sustainable development

19. Decision makers need concise information, put forward in a clear and unambiguous fashion and disembarrassed of minor details. The purpose is to illuminate certain phenomena or trends, through simplification, quantification and communication. 2/ In such form, indicators may not only be useful in improving information for decision-making, but may simplify reporting requirements as well through the replacing of extensive data or descriptive text by commonly agreed measures.

20. Agenda 21 recommends that countries at the national level and international governmental and non-governmental organizations at the international level should develop the concept of indicators of sustainable development in order to identify such indicators (para. 40.6) The value of indicators as policy

instruments is enhanced when they are used in combination with targets that have been set as part of national policies.

21. A number of countries are developing their own indicators, for the environment or for sustainable development. These include, inter alia, Brazil, Canada, Costa Rica, Cuba, Denmark, Finland, Germany, India, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and the United States. Other countries, including Turkey and Uganda, have indicated their intention to start work in this area.

22. In addition, the United Nations system, in coordination with other relevant organizations, is asked by Agenda 21 to provide recommendations for harmonizing the development of indicators at the national, regional and global levels, and for incorporating a suitable set of these indicators in common, regularly updated, and widely accessible reports and databases, for use at the international level, subject to national sovereignty considerations (para. 40.7).

23. Numerous organizations, both within and outside the United Nations system, have been working on the development of indicators related to sustainable development. The Economic Commission for Europe (ECE) is developing indicators within the context of its work on environment statistics and accounting. The Economic and Social Commission for Asia and the Pacific (ESCAP) is conducting a study on the development of environmentally sound and sustainable development indicators through the Inter-agency Committee on Environment and Sustainable Development in Asia and the Pacific that would complement the global initiative. The Economic Commission for Africa (ECA) is investigating the relevance of its work on social and economic indicators to sustainable development indicators. The Economic Commission for Latin America and the Caribbean (ECLAC) also has a programme to assist countries of the region in this area. Other examples within the United Nations system include the work of the Statistical Division of the United Nations Secretariat (UNSTAT) on environmental indicators and accounting; UNDP in the area of assessment of sustainable human development, as laid out in the Human Development Report, including the aggregate human development index (HDI); UNDP/United Nations Sudano-Sahelian Office (UNSO) on desertification indicators; UNEP on environment indicators and in its work on the global environment outlook; the United Nations Centre for Human Settlements (Habitat) on urban shelter indicators for local and national Governments; the World Bank on sustainable development indicators; the United Nations University (UNU), with the World Bank, on indicators for environmental monitoring; the World Health Organization (WHO) on 12 global health indicators; UNEP and WHO on local indicators linking environment and health data; the International Labour Organization (ILO) in the area of rapid poverty assessment; the World Meteorological Organization (WMO) on climate change detection indicators; the Food and Agriculture Organization of the United Nations (FAO) in the area of low-cost indicators for monitoring sustainable agriculture and rural development and, with the International Tropical Timber Organization (ITTO), on the development of a framework for sustainable forest conservation and management for use at the national level; the United Nations Industrial Development Organization (UNIDO) on the significance for sustainable development of its work on industrial statistics and related indicators; and the Committee for

Development Planning on indicators for identifying the least developed among the developing countries and evaluating their economic and social progress.

24. Other intergovernmental organizations, such as the Organisation for Economic Cooperation and Development (OECD), the European Union and the World Conservation Union, as well as such non-governmental organizations as the International Institute for Applied Systems Analysis (IIASA), World Wide Fund for Nature, the New Economics Foundation, the Worldwatch Institute, the World Resources Institute and the Wuppertal Institute are all active in this area. The current role of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, as task manager of this issue, is to bring together the many actors in this field, to build on their work and to propose a cooperative programme for indicators for sustainable development that may directly serve the needs of the Commission on Sustainable Development, as well as all Member States. This programme of work is contained in Annex I.

25. In chapter 40 of Agenda 21, the Statistical Division of the United Nations Secretariat (UNSTAT) is requested to pursue the development of indicators for sustainable development at the national level. In 1993, a UNEP/UNSTAT Consultative Expert Group on Environment and Sustainable Development Indicators was created to begin addressing this issue. A (draft) framework for indicators of sustainable development was introduced by UNSTAT at the meeting of the Group.

26. As the next step in the consensus-building process, the Division for Sustainable Development of the Department for Policy Coordination and Sustainable Development, in a joint task force with UNSTAT, developed a framework of indicators for the proposed programme of work. This "Driving force-State-Response" framework is discussed in Annex I.

27. The objective of this work is primarily to make the indicators for sustainable development accessible to decision makers at the national level by defining those indicators, elucidating their methodologies and providing training and other capacity-building activities, as relevant. Indicators, as used in national policies, may also be used in the national reports to the Commission on Sustainable Development and other intergovernmental bodies.

28. The draft framework was presented at a workshop on indicators hosted by the World Bank in Washington, D.C., on 22 and 23 September 1994. The workshop was attended by a large number of organizations working in the field of indicators for sustainable development as well as representatives of some Governments. The participants recognized that there are many organizations working on developing indicators for sustainable development, and that it would be useful to harmonize these efforts towards producing a menu of indicators for use in monitoring progress towards sustainable development at the national level. It was also recognized that such a menu should be used in a flexible manner, as priorities and problems differ between countries and regions.

29. Participants in the SCOPE project on indicators of sustainable development agreed that the SCOPE project should use the same menu of indicators as that being developed on behalf of the Commission on Sustainable Development. The project aims to develop a limited set of highly aggregated indicators for policy-making at the national and international levels. The meeting organized

by Belgium, Costa Rica, the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, UNEP and SCOPE provided a forum for both experts and users from Governments, international organizations and non-governmental organizations to discuss the scientific validity, technical feasibility and political acceptability of various approaches to the development of indicators for the Commission.

30. Work on developing highly aggregated indicators for sustainable development may proceed concurrently with further development of the menu. Although this represents a longer-term effort, it is important for three reasons: it explores the relationship among the variables, which lies at the heart of the linkages intrinsic to sustainable development; it concentrates information collection and analysis and facilitates presentation to decision makers; and it may serve as the basis of an early warning system, if desired.

31. The proposed common framework for the indicators, criteria for choosing indicators, a programme of work and a menu of indicators for sustainable development for consideration by the Commission on Sustainable Development are contained in Annex I. It is proposed that the Commission agree that work will proceed on this basis, with the understanding that this is a flexible, working menu of indicators that will be fine-tuned by countries according to their own specific needs, after further methodological work, testing and training.

32. It is also proposed that the Commission on Sustainable Development encourage continued cooperation with the work under way on environment indicators under the auspices of the Statistical Commission.

B. Data collection and use

33. Countries and international organizations are requested in Agenda 21 to carry out inventories of environmental, resource and developmental data, based on national/global priorities. Of the countries that provided national reports for chapter 40, half indicated that they had undertaken such inventories within the previous two years. The objectives are primarily three: improved management of sustainable development; identification of gaps; and organization of activities to fill those gaps.

34. Particular reference is made in this context to the strengthening of the United Nations system-wide Earthwatch and the suggested creation of a Development Watch. In the context of chapter 40, including the study for Earthwatch, an inventory was undertaken of United Nations system data and activities in these areas. 3/ This inventory demonstrates the wealth of activities across the United Nations system generating information useful for decision-making and the potential for assembling that information more effectively in support of national policy-making and environmental management and in implementation of Agenda 21.

35. The material provided in the inventory, as well as additional information submitted by national Governments, the United Nations system, and non-governmental organizations, also identifies some of the significant gaps to be filled. Among these gaps is the weakness in data collection and assessment

particularly with respect to the following (the references in parentheses are to programme areas of Agenda 21, for example, "5c" denotes programme area C of chapter 5):

(a) Local population programmes (5C);

(b) Health risks from pollution and hazards; data on environmental accidents (6E);

(c) Energy and transport in the context of human settlements (7E);

(d) Comparative evaluation of energy sources (9B);

(e) Global isotope monitoring of atmospheric trace gases and river run-off as a part of global change research; impact of aircraft engine emissions in the upper atmosphere (9D);

(f) Mountains: strengthening knowledge and integrated watershed development (13 A and B);

(g) People's participation in agricultural policy (14B);

(h) Land conservation and rehabilitation; monitoring of land resources (14E);

(i) Plant nutrition (14J);

(j) Rural energy (14K);

(k) Application of biotechnology to food and raw materials (16A);

(l) Application of biotechnology to improving human health (16B);

(m) Oceans: establishment of global marine databases supported by geographical information systems (GIS) as well as a network of marine laboratories for emergency situations; better-quality fishery data at the national level (17);

(n) Classification and labelling of toxic chemicals; preparation of a priority list for chemicals and accelerating risk assessment for priority chemicals (19B);

(o) Prevention and management of hazardous wastes (20 A and B);

(p) Disposal and treatment of wastes (21 C and D);

(q) Information on the role, activities and participation of major groups (23-32), and especially of non-governmental organizations (27), local authorities (28), entrepreneurs (30) and farmers (32);

(r) Availability of environmentally sound technologies (34);

(s) Promotion of the local production and use of sustainable development information (including traditional information) and community-based initiatives.

36. Even where good data exist, the geographical coverage is in many cases neither consistent nor universal. This highlights the need for georeferencing of data and for coordinating the collection of data across sectors and organizations, at national and regional levels. For many sectors, local-level comparisons, such as intra-urban differences or intra-district differences, may also be critical in illuminating the issues and supporting the solutions.

1. United Nations system-wide Earthwatch

37. Earthwatch has constituted the framework, since the United Nations Conference on the Human Environment held in Stockholm in 1972, for the efforts of the United Nations system to monitor and assess the global environment. In response to the General Assembly and the UNEP Governing Council, the United Nations system-wide Earthwatch is being redesigned and strengthened as a closely linked collaborative set of international efforts to coordinate, harmonize and integrate observing, assessing and reporting activities.

38. The objective is to provide environmental and appropriate socio-economic information for national and international decision-making on sustainable development and for early warning of emerging problems requiring international action. This should include timely information on the pressures on, status of and trends in key global resources, variables and processes in both natural and human systems and on the response to problems in these areas.

39. The major issues that Earthwatch addresses include the following:

(a) Observing the capacity of land resources and the impacts of processes such as deforestation, soil degradation and desertification;

(b) Loss of natural areas and biodiversity;

(c) Protection of the atmosphere;

(d) Quantity and quality of freshwater resources;

(e) State of the oceans and coastal areas;

(f) Human health conditions and quality of life determined by the environment, including the living and working environment of the poor;

(g) Accumulation of wastes, particularly hazardous wastes, and chemicals;

(h) Risks of biotechnology.

In addition, Earthwatch must be alert to new and emerging issues, and in particular to the inevitable interactions between all these issues and development processes, where threats to development prospects and to human well-being may emerge. Thus the United Nations system-wide Earthwatch cannot be

content to assess each problem separately, but must build the capacities to examine them all together and to draw out the key policy issues to be addressed by the international community.

40. Such an effort cannot be undertaken by any United Nations organization alone. It requires the combined efforts of the whole United Nations system and many outside partners, with each of the organizations with major environmental or resource concerns taking a lead in its particular sector, and with UNEP, in its coordinating role for the environment, looking at how all of the parts fit together into an integrated whole.

41. In implementing Earthwatch, the United Nations system will facilitate access to information on environmental activities, and to information held by each part of the system. It will identify possibilities for collaboration and mutual reinforcement in observation and assessment programmes within and outside the United Nations system. It will promote capacity-building for data collection, assessment and reporting, as well as improve the harmonization and quality control of data and the standardization of methodologies. Earthwatch will also facilitate the wider use of information and assessments from each partner in national and international decision-making, and seek to coordinate joint reporting on the global state of the environment and sustainable development. Earthwatch may also identify priorities for international action; give early warnings of emerging environmental problems; and share experience in applying new technologies and in increasing the impact of information. Earthwatch may also contribute to organizing coherent plans for activities responding to United Nations system-wide mandates such as Agenda 21.

42. An Earthwatch Working Party, comprising all the concerned United Nations system organizations, was organized by UNEP to support the continued development of Earthwatch and to facilitate the taking of decisions in common. UNEP has also established a small Earthwatch secretariat to maintain a continuous liaison among the partners and to assist in implementing common activities. Reference is made thereto in annex II of this report.

2. Development Watch

43. A significant gap that was highlighted in chapter 40 and whose existence was reiterated by the Commission on Sustainable Development at its first session, as well as by the United Nations system organizations in their review of Earthwatch, was the lack of a Development Watch. While the environmental perspective of Earthwatch is necessary to identify the environmental limits to sustainability, the lesson of Rio de Janeiro is that environmental protection can no longer be considered in isolation from development.

44. A cooperative effort among the organizations of the United Nations system has now begun with respect to preparing proposals for Development Watch. For example, at an Expert Group Meeting, jointly organized by the Department for Policy Coordination and Sustainable Development and UNDP in New York, on 14 and 15 December 1994, it was proposed that a Development Watch should be established to assist decision makers, especially those at the national level, to understand the interaction among physical (environmental), social and economic phenomena

and the policy options these interactions suggest. It could also facilitate coordination of data collection and presentation by United Nations system organizations in the area of sustainable development.

45. Whereas Earthwatch is primarily a global information system, Development Watch could be based on national information systems. While they may not be fully analogous, they would be complementary. Earthwatch would serve as a feeder of information into Development Watch and the two systems would be coordinated.

46. Development Watch would use existing data and would be linked to the ongoing work on indicators for sustainable development, including efforts to define highly aggregated indicators. Since it is intended to be operational at the national level, it would be linked to targets established by the concerned countries themselves. Where targets do not already exist, key issues for a country could be identified, and targets promoted, based on these issues.

47. The precise outputs of Development Watch need further definition, but they might include tables of data on those indicators monitored at the national level and presentations of the results of analyses of emerging issues. Whenever appropriate, outputs could be produced in cooperation with Earthwatch and linked to capacity-building and training activities.

48. To become operational, Development Watch would require an organizational focal point at the national level and agreements on cooperation among the participating organizations. The UNDP country offices could serve as national focal points.

49. Additional work is needed to define more precisely the objectives, activities and outputs of Development Watch and its relationship to Earthwatch. This will require further consultations both within and outside the United Nations system; UNDP, with UNEP and the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, might take the lead in organizing this cooperation and reporting thereon to the Commission at its fourth session.

C. Improvement of methods of data assessment and analysis

50. Work is under way at the national level in many countries, as follows: national and local governments are taking the initiative in establishing data and information inventories. The development both of national frameworks for information and of indicators also represents an attempt by countries to improve data collection, assessment and analysis. In addition, both Earthwatch and Development Watch are attempts by international organizations to develop practical methods for coordinated, harmonized collection and assessment of data at national and international levels. UNSTAT's programme of work will focus on, inter alia, the development of concepts and methods of environmental indicators and integrated environment and economic accounting.

51. Another example has been the joint development by the relevant United Nations bodies and the international scientific community of a Global Climate

Observing System, a Global Ocean Observing System and a Global Terrestrial Observing System to organize operational long-term programmes of measurements necessary to understand and model how global systems work and to detect possible signs of predicted global change. These systems aim to bridge the gap between short-term research programmes and operational data collection for management purposes; and if adequately supported by Governments, they should be able to supply globally coordinated and comparable data sets necessary to determine important trends and to provide the bases for early warning systems. Other more specialized systems are being established or strengthened in particular fields, usually within these general frameworks.

52. Many examples are also available from among non-governmental organizations working at the international level. NGONET, for example, operates a global environmental and development network, through a series of regional nodes, with specific concern for the information needs of the South, indigenous peoples, women and grass-roots organizations. The International Institute for Environment and Development (IIED) is planning to establish an international resource centre for participatory approaches and methods, and it is working on behalf of ITTO to develop a "Forest Resources Accounting System". IIED also produces a series of guides on environmental assessment and natural resource and sustainable development strategies, and it collaborates with the International Union for the Conservation of Nature and Natural Resources (IUCN) to provide the International Environmental and Natural Resource Assessment Information Service (INTERAISE). This consists of a computerized database of country environmental and natural resource documents, selected regional directories, a documentation centre, and an information referral service.

53. Work at the national level is being supported in many cases by various organizations within the United Nations system, in their respective areas of activity. One of the most recent initiatives is the Sustainable Development Network Programme (SDNP) being undertaken by UNDP, in cooperation with other organizations within and outside the United Nations system. UNDP is also considering a second and complementary programme at the country level to enhance information flows, whereby electronic and conventional data and information from various parts of the United Nations system and other organizations might be provided, in an open fashion, through the UNDP country office or some other local institution. In both cases, emphasis would be given to assessment of demand at the national level.

54. Most of the agencies that collect data or build national capacities to do so have active programmes to develop standardized methods, harmonize definitions and classifications, and ensure quality control of the data collected. Such activities are essential to any use of information beyond the local area, and the lack of such common approaches in certain fields has prevented the global assessment of some significant problems. One way to build a common understanding of terms is to organize, in a coordinated manner, very detailed information that is location-sensitive.

55. A tool that is becoming increasingly important for the assessment of environment and development trends and their potential consequences is computer modelling. It is such models fed by large quantities of data that have supported the majority consensus of international scientific opinion on the

potential for global warming from the greenhouse effect. Models are used routinely by WMO for weather prediction, by FAO to forecast crop yields and to give early warning of potential famines, and by WHO to assess the risks of morbidity and disability from diseases. UNEP in cooperation with various research centres is now exploring the use of models to integrate the many kinds of environmental, social and economic information and to study how they interact. The Department for Economic and Social Information and Policy Analysis of the United Nations Secretariat maintains and is developing further a global input-output model (GIOM) which integrates pollution and pollution-abatement activities and renewable and non-renewable resource use with production and consumption patterns for 16 world regions. The LEADnet Program of the Rockefeller Foundation is developing modelling techniques for presenting various impact scenarios and interactive case-studies to aid in decision-making.

56. Many of these models, and others developed by national-level users, are already being used in some countries to explore policy options and to give guidance for decision-making in sustainable development. At the same time, more work needs to be undertaken to explore the possibilities of enhanced interlinkages among models in their application. This topic is also considered in the report of the Secretary-General on changing consumption and production patterns (E/CN.17/1995/13).

57. It is also possible to programme the judgements and decision processes of experts, and various types of scientific information, into computerized expert systems, which can be adapted to local situations, and to make such expertise more widely available to decision-makers than would otherwise be possible. Some pilot systems for developing countries and regions have already been developed, and further progress in this area can be expected. FAO has made considerable progress with systems for agricultural planning, and WHO is developing systems for local health planning. UNEP is working with IIASA and others to explore the utility of expert systems in national state-of-the-environment analyses and reporting. Expert systems may help to bridge the information gap created by the lack of adequate scientific expertise in many countries and the long time required to build that capacity through educational programmes and practical experience.

58. Information can be provided at various geographical scales ranging from the scale of the local community to that of the planet. Since the issues at each scale are different, specific information mechanisms are required at each level, but the general principles discussed here still apply. Similarly, some issues can be addressed with numerical or statistical data, while others require data referenced to specific geographical locations so that they can be mapped and related spatially to other data.

59. Assessments could be more meaningful in some instances if they could be compiled for agro-ecological zones, ecoregions, river basins, and geographical entities such as coastal areas and mountain regions. An example is the river-basin framework that is being used by UNEP and partners as inputs into the global/comprehensive freshwater assessment. If data are georeferenced with their precise locations when collected (this is now becoming much easier with global positioning systems), they can easily be correlated in space through geographical information systems. Much information is in fact collected at

subnational scales, but it is generally combined into national statistics before being reported internationally, thus losing much of its value.

D. Establishment of a comprehensive information framework

60. The strengthening of Earthwatch and the establishment of a closely linked Development Watch should provide a coherent framework for information on sustainable development at the international level. These measures are already strengthening collaboration in the United Nations system, improving efficiency and increasing the value added to information collected.

61. At the same time, a number of Governments are moving towards structural integration of environment- and development-related ministries, through national councils, commissions, and other coordinating machinery. These new organizations may serve as the focal points for integrating environmental and developmental information as well. The development of indicators for monitoring progress at the national level towards sustainable development, through the implementation of Agenda 21, should also assist in this process.

62. Efforts at both the international level and the national level rely on the involvement of relevant non-governmental as well as governmental and intergovernmental actors. Major groups, as represented in non-governmental organizations, are essential to the comprehensiveness of an information framework.

E. Strengthening the capacity for traditional information

63. Traditional information about environmental resources and sustainable forms of development needs to be brought into the national and international information systems. Participatory rural appraisal and planning and similar techniques can be encouraged as a part of systematizing traditional information. In the same manner that one may speak of "brokers" to help make a large amount of data accessible and relevant to national-level decision makers, so, too, should one consider the use of brokers to help translate traditional information into a readily usable format at all levels.

64. Several UNU field research projects/programmes address the issue of harnessing traditional and indigenous knowledge on environmental management, particularly in agricultural systems. Systematic efforts to learn from, adapt and utilize indigenous information are made within the collaborative research programme on Population, Land Management and Environmental Change, which is being carried out in key agro-ecological zones of tropical and subtropical environments. A related programme, on Mountain Ecology and Sustainable Development, implemented jointly with the NGO International Mountain Society, has focused on the human-environment interplay in the mountain and highland areas of the world since 1978. A third programme is concerned with indigenous knowledge in Africa for the conservation and utilization of traditional food crops, and medicinal and other useful plants, as well as soil and water conservation techniques.

65. Local Governments, from district through town to village level, should give particular attention to this issue. Non-governmental organizations working at both grass-roots and international levels, including, for example, NGONET, the Association for Progressive Communication and the Earth Council, may provide a valuable service by assisting in identifying, assessing and relating traditional information to national objectives, strategies and plans. UNDP's Sustainable Development Network Programme, which, by the end of 1995, with support from Capacity 21, will have expanded into 27 countries, should also assist in this process, along with work by IUCN in strengthening the role of indigenous peoples, including through the use of traditional knowledge.

66. At the same time, it is important to develop national and even international guidelines concerning the ownership of traditional information. It is well known that some private corporations search, especially, for traditional information of potential use in pharmaceuticals and other commercial areas. One of the most effective means for disseminating information about traditional knowledge may in fact be through the market-place. However, issues of intellectual property rights need to be carefully addressed in this area.

III. IMPROVING THE AVAILABILITY OF INFORMATION

A. Production of information usable for decision-making

67. Information is disseminated, by the international community, through a variety of formats to a wide range of users (see paras. 10 and 11). Annual and biennial reports and yearbooks contain largely textual and analytical information for a user who is likely to be more academic than political. Reports are prepared for intergovernmental and expert bodies; statistical data are made available through both printed and electronic form; and promotional material, such as brochures, bulletins, and newsletters, are regularly provided, primarily in print.

68. All of these are important and often, in fact, mandated. They are relevant to decision-making by popularizing areas related to sustainable development and thus helping to create an informed public; by providing technical data for scientists, engineers and other trained cadres who rely on these inputs for the analysis and recommendations that feed into the political process; and by suggesting broad goals, objectives and policy options for discussion at intergovernmental forums. None the less, most of this information is not available in a format for immediate and direct use by decision makers at national and local levels. The exceptions, including some of the more experimental attempts, are interesting and highlight the direction that information dissemination may take.

69. In general, decision makers may be understood to need information that is succinct, that is representative, and that allows some play for alternative scenarios and customizing for national (or local) conditions. Indicators should assist in this process. There needs to be up-to-date information on the current situation, georeferencing, and some way of anticipating what the future may hold through modelling, projections and scenarios, leading to policy options and their implications. Textual reporting remains important as providing

"standalone" analyses and as helping to confer meaning and context on quantitative data.

70. An interesting example of what could serve as a useful tool for decision makers is the Electronic Atlas of Agenda 21, currently being developed by the International Development Research Centre (IDRC), Canada. The initial component of this project will develop an Atlas shell as well as an application dedicated to chapter 15 of Agenda 21, entitled "Conservation of biological diversity". This biodiversity volume will include a geographical database on compact disk read-only memory (CD-ROM) for monitoring indicators of biodiversity; two multimedia scenarios on biodiversity; and associated tools to complete the Atlas functionally. The long-term objective of the Electronic Atlas is to cover all 40 chapters of Agenda 21. It would record specific successes (and failures) of models of sustainable development in open computerized forums for use by those involved in the implementation of Agenda 21 programmes.

71. Information is disseminated through print, diskette, and electronic networks. Virtually all United Nations system organizations use all three means, and for the immediate future, this redundancy in delivery is good as well as necessary. The objective may be to move towards electronic "on-line" services for rapid access, capability to handle large amounts of data and relative low cost for service. For example, World Weather Watch is now available via the Internet. Eventually, not only will electronic communication provide two-way communication and downloading of data, but it may also, through electronic seminars and workshops, put groups of experts, advisers and trainers at the disposal of decision makers in a manner that saves both time and money.

72. The Department for Policy Coordination and Sustainable Development has compiled a comprehensive, structured electronic record of Commission on Sustainable Development proceedings, and posted it with the UNDP Internet Gopher Server; Commission documents are also transmitted to the Association for Progressive Communications (APC) and the Togethernet networks. The Department for Policy Coordination and Sustainable Development is also promoting the development of an interface to permit direct access to the United Nations electronic archive (optical disk system) of United Nations parliamentary documents via the Internet, and it is using electronic conferences on the APC network to establish a dialogue with non-governmental organizations and other major groups. FAO's Global Forest Resources Assessment is increasingly making data available through electronic means. Country briefs for tropical countries are now available on diskette and Internet. The numerical information for the 1990 assessment for tropical countries will soon be available on diskette.

73. The reality for now, however, is that the number of countries as well as of relevant departments, institutes and organizations within countries that have the human, the technological or the telecommunications capacity to take advantage of the new electronic media are insufficient. At the same time, many organizations within the United Nations system, as well as several non-governmental organizations, are increasingly using a combination of print and diskette, and in fact the latter provides a medium-level entry into electronic information. It is less expensive to distribute than volumes of paper; it is easily duplicated and disseminated more widely throughout a

country; it permits direct entry of data into an information system; and, through its use, it builds both technological and human capacity.

74. A large number of organizations are involved in the collection and compilation of environment and related information and statistics in countries. Preparation of an inventory of who is doing what on a regular basis would help to avoid duplication of activities and facilitate the establishment of electronic networking, at both national and international levels. In the latter arena, a start has been made by ESCAP, in collaboration with UNEP/Global Resource Information Database (GRID) and the inter-agency task force on environment statistics.

75. Discussions concerning dissemination of information tend to focus on the sender. However, unless the user has the capacity to receive the information, to interpret it, and to incorporate it into the decision-making process, the amount and quality of information provided are irrelevant. Capacity-building programmes therefore need to emphasize support for a local brokering capability and to assist decision makers to make better use of the information available. Capacity-building must also include training for the overall handling of technical data, for the use of information technologies, for the assessment of needs as well as of information and impact, for the collection and monitoring of data, and for the development and use of methodologies. Capacity-building must be directed not only towards human resource development but also towards institutional strengthening, through the provision of information technologies and access to the relevant networks.

76. A major thrust is also needed to ensure that updated information is available in university and other institutional libraries as well as public libraries by the installation of information technology. Such a programme would have important long-term consequences for the training of future decision makers, as well as for the in-service training of present ones. WHO and UNEP have established the Global Environment Library Network (GELNET) for the specific purpose of strengthening the information supply via libraries.

77. All organizations in the United Nations system and many non-governmental organizations, as well as bilateral initiatives, include capacity-building in their information programmes, and most of them target all of these objectives. None the less, the lack of sufficient human and financial resources to accomplish fully all of the capacity-building that is needed is a major constraint. Additional financing should be made available for this purpose. In addition, the United Nations system and other organizations should seek ways to gain efficiencies through cooperative training workshops and courses, through the provision of standardized equipment, and, where appropriate, through on-line instruction. One programme currently under joint development by the United Nations (interim secretariat for the United Nations Framework Convention on Climate Change), UNEP, the United Nations Institute for Training and Research (UNITAR) and UNDP is CC:COPE, which has a training component entitled CC:TRAIN. This involves training in the application of environment management guidelines, Capacity 21 and other relevant programmes, and it relies on SDNP to provide the capacity, and the resources, at the national level, to use the systems.

B. Standards and methods for handling information

78. Countries, the United Nations system collectively, and a number of international non-governmental organizations have a wealth of information, but it is largely distributed on a sectoral basis to a specialized constituency. Its value for sustainable development could be greatly increased by cross-linking the data through interdisciplinary analysis, for example, by relating epidemiological data on health conditions with environmental data on pollution problems in the same area. This would require agreement on standard methods and definitions so that such comparisons could be made effectively. The move of several national Governments to establish inter-agency working groups and councils, as well as to develop national indicators for sustainable development, is greatly assisting in the integration of the analysis of relevant data.

79. Within the United Nations system the issue of interlinkage and cross-sectoral standardization is being addressed by Earthwatch. As the Earthwatch System develops, other, non-United Nations system organizations will also be invited to participate.

80. The access to information by decision makers is also influenced by the availability of brokers that assist in the analysis of data and repackaging of information in appropriate formats. Two organizations, the interim secretariat for the United Nations Framework Convention on Climate Change and WHO, have indicated that they are using or are planning to use the Consortium for International Earth Science Information Network (CIESIN) for this purpose. UNDP uses the Sustainable Development Networks as brokers. The International Institute for Sustainable Development (IISD) has published a sourcebook on sustainable development that it intends as a "filter" for decision makers of key materials and sources of relevant information. NGONET has as its main role that of an "information broker" among local, regional and international levels.

81. Others use their country-level offices, workshops, experts or consultants in this capacity. Some indicate that they repackage information themselves, into popularized editions of data. However, most of the responding organizations note that no brokers are used. Since this is an issue at the heart of interpreting complex data into policy options, more attention should be devoted to the using of brokers and possibly to the coordinating of brokered information at the national and regional levels.

C. Development of documentation about information

82. One of the outputs of the Advisory Committee for the Coordination of Information Systems (ACCIS) before it was dissolved was a Database of United Nations Databases and Information Services (DUNDIS), which is now being evaluated by a task force of the Information Systems Coordination Committee (ISCC). ACCIS also completed a fifth edition of the Macrothesaurus, and responsibility for the maintenance of this has been delegated to the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat. 4/

83. Other efforts are being undertaken by non-governmental organizations, including the thematic guides produced by CIESIN, and the Commonwealth Agricultural Bureau (CAB) Thesaurus, undertaken in cooperation with FAO, IDRC and the United States Department of Agriculture (USDA). IUCN is also involved in the development of meta-information, through INTERAISE, a Sourcebook for Conservation and Biodiversity Information, and a Geneva-area Roundtable on Environmental Information and Documentation (an informal network of 29 intergovernmental organizations, non-governmental organizations and Swiss organizations).

84. An organization within each country should be responsible for coordinating meta-information on all programme areas of Agenda 21 at the national level. This organization may vary from country to country; it will preferably be a national unit, although a United Nations system organization, such as UNDP, may serve as the focal point in the initial, capacity-building stages. In so far as a considerable amount of regional information activity is already taking place, such as through regional GRID-compatible centres, the Regional Seas Programmes of UNEP, the regional commissions and other regional organizations, support for regional level organization should be strengthened.

D. Establishment and strengthening of electronic networking capabilities

85. By creating mechanisms to search for and collect just the information that is required from many data repositories, electronic networks can eliminate the need to gather all data into one place. This requires what is now called meta-data, that is information as to who holds what kinds of data, where those kinds of data are to be found, and how to access them. The explosion of new electronic information technologies and their spread around the world are rapidly making possible new and more effective approaches to providing information for decision-making. The Economic and Social Commission for Western Asia (ESCWA), for example, in cooperation with the Joint Committee on Environment and Development in the Arab Region, is working towards the creation of an integrated Arab environmental network for policy makers in the area.

86. Inputs to this report indicate a very large and diverse set of networks on overlapping topics. Identifying and understanding the purpose of each of these networks are a daunting task for international organizations, but the problem is likely to be more complex at the national level. In order to address this problem, task managers of the Inter-Agency Committee on Sustainable Development might consider the possibility of developing and disseminating meta-information in their respective programme areas of Agenda 21.

87. Task managers could also organize, as appropriate, inter-agency task forces on cross-sectoral meta-information (for example, water/health/agriculture). These task forces could further investigate the possibilities for streamlining existing networks and avoiding the creation of new networks whenever feasible and desirable. Such task forces should include, where relevant, experts from the national level, as well as non-governmental organizations.

88. The Inter-Agency Committee on Sustainable Development may wish to address the issue of "meta-networks", through which all United Nations system organizations might be linked to each other and to other major providers of data.

89. Several organizations involved in research and capacity-building for sustainable development, including some private foundations and bilateral donors have agreed to create BELLANET. This electronic network is expected to assist donors, and others to improve their performance, eventually through concerted efforts and financial collaboration in all areas of sustainable development. During the pilot phase, attention will be focused on biodiversity, forestry, energy; and the system-wide issue of research investment plans, information for decision-making and capacity development in environment, within a country programme focus.

90. The work of NGONET has already been mentioned. Also notable are the three networks fostered by the Earth Council: (a) a network linking environmental and development ombudsmen around the world; (b) a meta-network joining already existing educational, information and training networks; and (c) a network of national councils on sustainable development.

91. In setting up electronic networks of information, efforts should be made to provide the financial and technical support, where needed, to enrol all interested low income countries. This modest expenditure could dramatically expand the information base as well as have a major development impact.

E. Making use of commercial information sources

92. For information to be available for decision-making, there are some barriers to the necessary flow of information that must be overcome. There is an increasing problem with access to information for public purposes, often because of the cost of obtaining it. Non-governmental organizations, and even some government departments, are trying to find ways to cover their costs, and they see data sales as one option. In some countries, public services are being privatized. Since business users of data can usually pass the costs on to their customers, data charges are often set at what the private sector can afford to pay, thereby pricing public services, including organizations of the United Nations system, out of the market.

93. Generally, financial resources are required to purchase information held by private vendors. However, more creative solutions may be found to access this information through a "bartering" system. For example, the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat has begun a programme whereby the documents of the Commission on Sustainable Development and other relevant bodies are sent to major commercial information vendors for coverage in their bibliographic databases. In return, the Department for Policy Coordination and Sustainable Development gains access to privately held information. National centres, by participating in the GRID cooperating centres, get access to technology and data that might not otherwise be accessible. In return, UNEP/United Nations gets improved national data.

94. All projects geared towards sustainable development should contain, parallel to the need to seek innovative approaches to accessing privately held information, funding for information collection, analysis and dissemination. In order to enhance the quality and utility of the data, a marketing strategy would need to be adopted by the relevant agencies.

IV. CONCLUSIONS AND PROPOSALS FOR ACTION

95. 1. The Commission on Sustainable Development is requested to direct its attention to the proposed programme of work for developing a menu of indicators for sustainable development. It is proposed that the Commission approve the programme of work, including the following: (a) enhanced information exchange among all interested actors; (b) development of methodology sheets, to be made available to Governments; (c) training and capacity-building at regional and national levels; (d) testing of the menu of indicators and monitoring of experiences in three to four countries; (e) evaluation of the menu and adjustment, as necessary.

96. 2. National Governments should ensure, consistent with their institutional coordination for sustainable development, the integration of information for sustainable development at a country level. This should include the development of a comprehensive and coherent information programme, drawing upon public participation in data collection and assessment. In this context, support should be given to such activities as the Sustainable Development Network Programme of UNDP.

97. 3. Through the coordination of UNEP, the United Nations system, with non-governmental organizations, as relevant, should fully support, strengthen and operationalize Earthwatch. UNDP, with UNEP and the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, and in cooperation with other interested organizations, should further define Development Watch. Earthwatch and Development Watch should evolve as two closely linked support systems for the monitoring and assessment of sustainable development. A programme of work for Development Watch and its linkage to Earthwatch should be provided to the Commission at its session in 1997.

98. 4. The organizations of the United Nations system should work towards developing a common or compatible system of access to their respective databases, in order to share data fully, to streamline the collection and interpretation of data and to identify data gaps.

Notes

1/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

2/ Dr. Albert Adriaanse, Environmental Policy Performance Indicators: A Study on the Development of Indicators for Environmental Policy in the Netherlands (The Hague, SDU Publishers, April 1993), pp. 9-11.

3/ The results of this inventory are contained in a table that is being made available to the Commission as a "back-of-the-room" paper. It is also available through both the secretariat of the Commission and the secretariat for the United Nations system-wide Earthwatch. The reader may also wish to refer to a Synopsis of Programmes and Activities in Environmental Statistics, Indicators and Accounting (11 January 1995) prepared by UNSTAT under the aegis of the Statistical Commission and available from the office of the Director of UNSTAT.

4/ See the report of the Information Systems Coordination Committee (ACC/1994/ISCC/12) of 9 February 1994, para. 78.

Annex I

PROGRAMME OF WORK ON INDICATORS FOR SUSTAINABLE DEVELOPMENT

Introduction

1. Chapter 40 of Agenda 21 calls for the development of indicators for sustainable development. In particular, it requests countries at the national level, and international governmental and non-governmental organizations at the international level, to develop the concept of indicators of sustainable development in order to identify such indicators (para. 40.6). This issue was raised during the first two sessions of the Commission on Sustainable Development, at which time a large number of countries emphasized the urgent need for those indicators. Other countries expressed some concern and insisted that indicators be developed in close contact with Governments. Pursuant to the multi-year thematic programme of work adopted by the Commission at its first session, the progress achieved on developing these indicators, within the context of chapter 40 of Agenda 21, will be discussed by the Commission during its third session.

2. Indicators are called for when there is a need for informed decision-making and associated, cost-effective data collection so as to respond to that need. In order to assist decision makers at all levels, and to increase focus on sustainable development, indicators for monitoring progress towards sustainable development are needed. The value of indicators as policy instruments is enhanced when they are used in combination with targets that have been set as part of national policies.

3. The objective of this work programme is to make the indicators for sustainable development accessible to decision makers at the national level by defining them, elucidating their methodologies and providing training and other capacity-building activities, as relevant. Indicators, as used in national policies, may also be used in the national reports to the Commission and other intergovernmental bodies.

4. A number of countries are developing their own indicators, for the environment as well as for sustainable development. In addition, several organizations, both within and outside the United Nations system, have been working on the development of indicators related to sustainable development. (Additional information on these activities is contained in the main body of the present report, paras. 20-24.) The current role of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, as task manager of this issue, is to bring together the many actors in this field, to build on their work and to propose a cooperative programme for indicators for sustainable development that may directly serve the needs of the Commission on Sustainable Development, as well as all Member States.

Indicators for sustainable development

5. When developing the indicators, it is important to address the challenge of fully integrating the social, economic, environmental and institutional aspects

of sustainable development. Much further work, primarily by the scientific community, is needed in order to understand and explain these interlinkages.

6. Social indicators have been developed over the past years and are used all over the world. Economic indicators have also been used for many years at national, regional and international levels. It is feasible to select from among these social and economic indicators some that capture the specific issues most relevant to sustainable development. Environmental indicators have been developed more recently. For some of the environmental aspects, considerably more work needs to be done to make the data available.

7. Based on the relevant indicators that are available, it is proposed that the Commission on Sustainable Development agree to work proceeding on the basis of a menu of indicators, as presented below, with the understanding that this is a flexible, working instrument which will be fine-tuned with respect to the needs of countries after further methodological work, testing and training. It is further proposed that the Commission approve the programme of work on indicators for sustainable development, as contained in paragraphs 22-26 below.

8. It is also proposed that the Commission on Sustainable Development encourage continued cooperation with the work under way on environment indicators under the auspices of the Statistical Commission.

Highly aggregated indicators

9. Concurrently, work may proceed with developing highly aggregated indicators for sustainable development. Although this represents a longer-term effort, it is important for three reasons: it explores the relationship among the variables, which lies at the heart of the linkages intrinsic to sustainable development; it concentrates information collection and analysis and facilitates presentation to decision makers; and it may serve as the basis of an early warning system, if desired.

10. In addition to other existing efforts in this area, a project is now being undertaken by SCOPE, in cooperation with UNEP, aiming at developing highly aggregated indicators for sustainable development. This initiative is currently focusing on the environmental aspects of sustainability, although the project could be broadened to focus on other aspects of sustainable development as well.

A menu of indicators for sustainable development

11. A menu of indicators, as contained in this annex, is proposed for use by decision makers in monitoring progress at a national level towards sustainable development through the implementation of Agenda 21. It is fully recognized that there is need for flexibility, as the conditions, activities and priorities for sustainable development differ from country to country. At the same time, the widely articulated desire for international consistency calls for the development of standardized concepts, definitions and classifications of indicators.

12. Regional workshops and capacity-building programmes are needed in order to facilitate the use of the menu of indicators at a national level. In addition

to the existing experience of a range of countries, testing of the indicators in three to four countries could be used to gain experience and further develop the indicators, and evaluation of the use of the indicators at the national level, and national and international developments, could be used to adjust the menu of indicators if necessary.

13. The indicators in the proposed framework have been developed, in accordance with the following criteria, to be:

(a) Primarily national in scale or scope (countries may also wish to use indicators at State and provincial levels);

(b) Relevant to the main objective of assessing progress towards sustainable development;

(c) Understandable, that is to say, clear, simple and unambiguous;

(d) Realizable within the capacities of national Governments, given their logistic, time, technical and other constraints;

(e) Conceptually well founded;

(f) Limited in number, remaining open-ended and adaptable to future developments;

(g) Broad in coverage of Agenda 21 and all aspects of sustainable development;

(h) Representative of an international consensus, to the extent possible;

(i) Dependent on data that are readily available or available at a reasonable cost to benefit ratio, adequately documented, of known quality and updated at regular intervals.

14. As noted, the menu of indicators may change and new indicators may be included, for example, within the context of international legal agreements, or as national-level experience is gained. Furthermore, there are some potentially important indicators that require further methodological work before they can be used. This is especially the case for various ecosystem (georeferenced) indicators, and as regards the following issues, for which indicators are not included in the menu at this stage (references are to chapters of Agenda 21):

Chapter 4 and others: differential consumption patterns of the wealthy and the poor (including access to clean water among the poor; patterns of consumption of clean water among the wealthy)

Chapters 8, 38, 39 and 40: decision-making structures (driving force indicators); also, strengthening of "traditional information" (driving force and response indicators)

Chapter 13: sustainable mountain development (driving force, state and response indicators)

Chapter 15: issues of biodiversity (driving force)

Chapter 16: issues surrounding biotechnology (driving force, state and response indicators)

Chapter 17: oceans, all kinds of seas and coastal areas (response indicators)

Chapter 19: toxic chemicals

Chapter 20: hazardous wastes (response indicators)

Chapter 21: industrial/municipal discharges

Chapters 23-32: participation and representation of major groups in decision-making (driving force, state and response indicators)

Chapter 34: transfer of technology (driving force, state and response indicators)

Chapter 35: science (driving force, state and response indicators)

Chapter 37, and others: capacity-building (driving force, state and response indicators).

15. Research and experimentation with advanced social, economic and institutional indicators that might more effectively measure progress towards sustainable development and continued research and experimentation with environmental indicators appropriate for measuring progress towards sustainable development should be endorsed. There may also be a need for subsets and other, often more comprehensive sets of indicators for other purposes, including subnational, spatial and sectoral assessments.

The framework

16. The indicators in the menu are presented in a Driving force-State-Response (DSR) framework. The DSR framework is adapted from the widely agreed framework for environmental indicators, namely, the Pressure-State-Response framework. The concept of pressure has been replaced by that of "Driving forces", in order to accommodate more accurately the addition of social, economic and institutional indicators. Driving force indicators indicate human activities, processes and patterns that impact on sustainable development; "State" indicators indicate the "state" of sustainable development; and "Response" indicators indicate policy options and other responses to the changes in the state of sustainable development. Experience with this framework has been largely with environmental indicators only; its applicability to the broader needs of sustainable development will be tested through the programme of work.

17. It should be emphasized that the "column" and "row" structure of the trial menu of sustainable development indicators may be modified within the next few years, as more experience is gained. More effort, for example, may be needed to

represent the relationship between cause and effect, or impact. The use of the DSR framework is viewed as the first step in an iterative process.

18. In the menu, the indicators are grouped in categories covering the social, economic, environmental and institutional aspects of sustainable development. The indicators are related to chapters of Agenda 21. The coverage of the four aspects of sustainable development and of all the chapters of Agenda 21 ensures that most significant aspects of sustainable development are monitored by the indicators.

19. The result of this combined structure is a series of cells within which the indicators are presented. It is important to understand that there is as yet no implied causality among indicators between cells, either horizontally or vertically. Significant work must be undertaken on the question of interlinkages among indicators before causal relationships can be understood and expressed.

Actors and the programme of work

20. For clusters of indicators, various organizations will have the task of assuming a leading role in a transparent consultative process for the purpose of further developing the indicators, as relevant, including the underlying methodology, and of analysing the data availability for each indicator in order to provide a full description of each indicator in a set of methodology sheets. Based on their mandates and current activities, a number of organizations have agreed to serve as "lead agencies" for this purpose. These organizations include UNSTAT, the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, ESCAP, UNDP, the United Nations Children's Fund (UNICEF), UNDP/UNSO, UNEP, the secretariat of the Basel Convention, the United Nations Centre for Human Settlements (Habitat), the United Nations Conference on Trade and Development (UNCTAD), ILO, FAO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), WHO, the World Bank, UNIDO, and OECD and IUCN. In addition, this process will include, to the extent possible and as appropriate, the regional commissions and other interested organizations in the United Nations system, other intergovernmental organizations, national Governments, non-governmental organizations and other representatives of major groups.

21. The methodology sheets will contain, inter alia, the following information:

(a) An introduction that provides a statement of purpose, the policy relevance of the indicator, and its relationship to sustainable development;

(b) A methodological description of the indicators and the underlying definitions, including a short description of the indicators in relation to the Driving force-State-Response framework; and information on interpretation and design of the indicator;

(c) For each indicator, an assessment of the availability of data from national and international sources;

(d) Further readings and other references for additional information and contact points.

Summary of elements in the programme of work

22. With regard to activities related to the menu of indicators:

(a) Information exchange (1995 and continuing thereafter): there is a need for enhanced information exchange among all interested organizations, Governments and major groups on research, methodological and practical activities associated with indicators for sustainable development. At the international level, this should include, inter alia, establishing a freely accessible database with this information. To the extent possible, the relationship of indicator-related activities to national targets and needs should be specified. At the national level, the Sustainable Development Network Programme of UNDP could assist in coordinating the relevant information and improving access to the data;

(b) Methodology sheets (1995-1996): the lead agencies, as indicated above, through a transparent, consultative process, will describe the indicators in the menu, including their policy relevance and underlying methodology, and assess the data availability and the data sources for each indicator. This information could be included in a set of initial methodology sheets to be made available to Governments by 1996. Governments could choose from the menu those indicators relevant to their respective problems and priorities for use in national policy-making. The countries may also use the indicators, if they wish to do so, in their national reporting to the Commission on Sustainable Development at its fifth session in 1997;

(c) Training and capacity-building (1995-1998):

(i) Training should be provided for Governments and other relevant groups in using the indicators for monitoring progress towards sustainable development at a national level. This implies assistance, where requested, in adapting the menu of indicators for the needs/targets of the country. Further capacity-building programmes should be initiated, covering the whole field from collection of data to use in policy processes;

(ii) Priority should be given to training the trainers, including national scientists and other experts who could then provide broader training for the appropriate government actors. This training might best be provided at the regional level, with the support of the regional commissions or other regional organizations. There is a need to explore techniques for training that are more innovative and effective than those used traditionally;

(iii) Coordination of training activities at the national level is important and may be undertaken within the framework of Capacity 21. This includes broadening sectoral efforts of ongoing or projected activities of United Nations system organizations. National forums should be organized, for example, through national councils for

sustainable development, involving the government, the United Nations system, other intergovernmental organizations and representatives of major groups and of the media, to undertake capacity-building for indicators in the country;

(iv) To the extent possible, existing resources will be pooled and utilized in an efficient and cooperative manner for these activities. As needs arise, extrabudgetary resources may also be required and will be sought;

(d) Monitoring experiences in a few selected countries (1996-1998): testing of the indicators in three to four countries could be used to gain experience, assess applicability and further develop the indicators for sustainable development. It should be noted that testing and capacity-building are mutually reinforcing and should be planned in tandem;

(e) Evaluation of the menu (2000): the use of indicators for sustainable development at a national level is evaluated on all experience gained, and the menu of indicators adjusted as necessary.

23. With regard to developing highly aggregated indicators (the SCOPE/UNEP project): with the menu of indicators as an input, highly aggregated indicators will be developed to further facilitate decision-making at all levels. This could be undertaken and coordinated by the SCOPE/UNEP project, benefiting from the experience gained with the menu of indicators and focusing on all aspects of sustainable development.

24. With regard to further work on interlinkages: the scientific community is invited to undertake further work on identifying and assessing the linkages among the economic, social, institutional and environmental elements of sustainable development. SCOPE could facilitate the coordination of these efforts. In addition, a joint WHO/UNEP HEADLAMP Project is exploring interlinkage of data on development activities, health and environment for decision-making concerning sustainability. In 1995, intersectoral consultations and analysis for this purpose will be carried out in selected countries. Interested international bodies are encouraged to join in these efforts. The project will focus on developing and testing linkage-based indicators of relevance to policy at national and local levels.

25. Related activities: it is recognized that many other activities are ongoing, as noted in the introduction to this report. The scientific community, with the support and advice of United Nations system organizations, other intergovernmental organizations, Governments, non-governmental organizations and other representatives of major groups, is encouraged to undertake development of indicators for issues where no suitable indicators exist.

26. A progress report will be provided to the Commission on Sustainable Development at its fourth session, in 1996.

Menu of indicators for sustainable development

27. The menu of indicators for sustainable development presented below should be seen as a flexible menu from which countries can choose indicators according to national priorities, problems and targets. The indicators are presented in a Driving force-State-Response framework. "Driving force" indicators indicate human activities, processes and patterns that impact on sustainable development. "State" indicators indicate the state of sustainable development and "Response" indicators indicate policy options and other responses to changes in the state of sustainable development. The social, economic, environmental and institutional aspects of sustainable development are covered by this menu of indicators following the chapters of Agenda 21.

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
Social a/	3. Combating poverty	Employment rate (percentage) Ratio of average female wage to average male wage (percentage)	Population living in absolute poverty (number and percentage) Gini coefficient of income	
	5. Demographic dynamics and sustainability	Population growth rate (percentage) Net migration rate (people/year)	Population density (people per square kilometre (km^2))	Total fertility rate
	36. Promoting education, public awareness and training (including gender issues)	Rate of growth of school-age population Primary school enrolment ratio (percentage) Secondary school enrolment ratio (percentage)	Adult literacy rate (percentage) Population reaching grade five of primary education (percentage) Mean number of years of schooling	Gross domestic product (GDP) spent on education (percentage) Females per 100 males in secondary school (number) Women per 100 men in the labour force (percentage)
	6. Protecting and promoting human health	People without access to sufficient and safe drinking water (percentage) People without access to adequate sanitation (percentage) People exposed to high concentrations of health-damaging air pollution (percentage) People without adequate food supply (percentage)	Infant mortality rate (per 1,000 live births) Life expectancy at birth (years) Maternal mortality rate (per 1,000 live births)	GDP spent on health (percentage) Population covered by primary health care (percentage) Eligible population that has been fully immunized against key communicable diseases (percentage) Women of child-bearing age using/with access to family planning (percentage) National health expenditure devoted to local health services (percentage)

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	7. Promoting sustainable human settlement development (including traffic and transport)	Rate of growth of urban population (percentage) Transport fuel consumption per capita (litres) Number of megacities (Population 10 million or more)	Population in urban areas (percentage) Area and population of marginal settlements (km^2, number) Cost/number of injuries and fatalities related to natural disasters b/ (US dollars, number) Floor area per person (square metres (m^2)) House price-to-income ratio	Expenditure on low-cost housing (US dollars) Expenditure on public transportation (US dollars) Infrastructure expenditures per capita (US dollars) Housing credit portfolio
Economic a/	2. International cooperation	Real GDP per capita growth rate (percentage) Exports of goods and services (US dollars) Imports of goods and services (US dollars)	GDP per capita (US dollars) Environmentally adjusted domestic product (EDP) per capita/ environmentally adjusted value added (US dollars) Share of manufacturing value added in GDP (percentage) Export concentration ratio (percentage)	Investment share in GDP (percentage) Participation in regional trade agreements (yes/no)
	4. Changing consumption patterns c/	Depletion of mineral resources (percentage of proved reserves) Annual energy Consumption per capita (dollars)	Proved mineral reserves (tons) (t) Proved energy reserves (oil equivalents) Lifetime of proved energy reserves (years) Share of natural resource-intensive industries in manufacturing value added (percentage) Share of manufactures in merchandise exports (percentage)	Ratio of consumption of renewable resources to that of non-renewable resources (percentage)

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	33. Financial resources and mechanisms	Ratio of net resource transfer/GDP (percentage)	Total official development assistance (ODA) given or received (percentage of GDP) Debt/GDP (percentage) Debt service/export (percentage)	Environmental protection expenditure as percentage of GDP Environmental taxes and subsidies as percentage of government revenue Amount of new or additional funding for sustainable development given/ received since 1992 (US dollars) Programme of integrated environmental and economic accounting (yes/no) Debt relief
	34. Transfer of environmentally sound technology, cooperation and capacity-building			
Environmental				
Water	18. Protection of the quality and supply of freshwater resources	Annual withdrawals of groundwater and surface water as percentage of available water Domestic consumption of water per capita (cubic metres (m^3))	Groundwater reserves (m^3) Concentration of faecal coliform in freshwater bodies (number/100 millilitres (ml)) Biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in water bodies (milligrams (mg)/l)	Waste-water treatment (percentage of population served, total and by type of treatment)

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	17. Protection of the oceans, all kinds of seas and coastal areas	Catches of marine species (t) Population growth in coastal areas (percentage) Discharges of oil into coastal waters (t) Releases of nitrogen and phosphorus into coastal waters (t)	Deviation in stock of marine species from maximum sustained yield level (MSY) (percentage) Ratio of MSY abundance to actual average abundance (percentage) Algae index	Participation in maritime treaties/ agreements (yes/no)
Land	10. Integrated approach to the planning and management of land resources	Land use	Area affected by soil erosion (km^2)/erosion index	Land reform policy (yes/no) Decentralized local-level natural resource management (yes/no)
	12. Managing fragile ecosystems: combating desertification and drought	Fuelwood consumption per capita (m^3) Livestock levels per km^2 in dryland Population living below poverty line in dryland areas (percentage)	Land affected by desertification (km^2)/desertification index Drought frequency	
	13. Managing fragile ecosystems: sustainable mountain development			
	14. Promoting sustainable agriculture and rural development	Use of agricultural pesticides (t/km^2) Use of fertilizers (t/km^2) Arable land (hectares (ha)) per capita Irrigation of arable land (percentage)	Area affected by salinization and waterlogging (km^2)	Cost of extension services provided and cost of agricultural research (US dollars) Area of land reclaimed (km^2)
Other natural resources	11. Combating deforestation	Deforestation rate ((km^2)/annum) Annual roundwood production (m^3)	Timber stocks (m^3) Forest area (km^2) Wood consumption as percentage of energy consumption	Reforestation rate ((km^2)/annum) Protected forest area as percentage of total land area

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	15. Conservation of biological diversity		Threatened, extinct species (number)	Protected area as percentage of total land area
	16. Environmentally sound management of biotechnology			
Atmosphere	9. Protection of the atmosphere	Emissions of carbon dioxide (CO_2) (t) Emissions of oxides of sulphur (SO_x) and oxides of nitrogen (No_x) (t) Consumption of ozone-depleting substances (t)	Ambient concentrations of sulphur dioxide (SO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), ozone (O_3) and total suspended particulates (TSP) in urban areas (parts per million)	Expenditure on air pollution abatement (US dollars) Reductions in the emissions of CO_2, SO_x and NO_x (percentage per year)
Waste	21. Environmentally sound management of solid wastes and sewage-related issues	Generation of industrial and municipal waste (t)	Waste disposed/ capita (t)	Expenditure on waste collection and treatment (US dollars) Waste recycling rates (percentage) Municipal waste disposal (t/capita) Waste reduction rates per unit of GDP (t/year)
	19. Environmentally sound management of toxic chemicals			
	20 and 22. Environmentally sound management of hazardous wastes and radio-active wastes	Generation of hazardous waste (t) Imports and exports of hazardous waste (t)	Area of land contaminated by hazardous waste (km^2)	Expenditure on hazardous waste treatment (US dollars)
Institutional	35. Science for sustainable development			

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	37. National mechanisms and international cooperation for capacity-building			
	8, 38, 39 and 40. Decision-making structures		Mandated (environmental impact assessment (EIA) (yes/no) Programmes for national environmental statistics and indicators for sustainable development (yes/no) Sustainable development strategies (yes/no) National councils for sustainable development (yes/no) Main telephone lines per 100 inhabitants (number)	Ratification of international agreements related to sustainable development (number) Number of local government employees per 1,000 of population (number) Personnel expenditure ratio (proportion of recurrent expenditure spent on wage costs (percentage)
	Strengthening of "traditional information" (part of 40)		Representatives of indigenous people in national councils for sustainable development (yes/no) Existence of database for traditional knowledge information (yes/no)	
	Section III (23-32). Strengthening the role of major groups		Representatives of major groups in national councils for sustainable development (yes/no)	

Notes

a/ Many of these indicators exemplify and represent large, well-established sets of indicators. Processes to enhance the relevance of these sets to sustainable development are under way and should be encouraged.

b/ Indicators of vulnerability are to be developed following the Programme of Action for the Sustainable Development of Small Island Developing States, as contained in the Report of the Global Conference on the Sustainable Development of Small Island Developing States, Bridgetown, Barbados, 25 April-6 May 1994 (United Nations publication, Sales No. E.94.I.18 and Corr.1 and 2), chap. I, resolution 1, annex II.

c/ Production and consumption patterns are also reflected in particular by the following indicators:

Share of manufacturing value added in GDP (under "Economic")

Export concentration ratio (under "Economic")

Ratio of consumption of renewable resources to that of non-renewable resources (under "Economic")

Transport fuel consumption per capita (under "Social")

Domestic consumption of water per capita (under "Environmental/water")

Fuelwood consumption per capita (under "Environmental/land")

Annual roundwood production (under "Environmental/other natural resources")

Wood consumption as percentage of energy consumption (under "Environmental/other natural resources")

Consumption of ozone-depleting substances (under "Environmental/atmosphere")

Annex II

UNITED NATIONS SYSTEM-WIDE EARTHWATCH

1. In the strengthening of the system-wide Earthwatch since the United Nations Conference on Environment and Development (UNCED), an Earthwatch Working Party of all the United Nations organizations concerned has been organized to facilitate the taking of decisions in common. UNEP has established a small Earthwatch secretariat to maintain a continuous liaison among the partners and to assist in implementing common activities. It is envisaged that many functions of Earthwatch can be carried out by ad hoc groups of experts drawn from all of the organizations. Some of the first initiatives being developed are described below. The aim is to achieve maximum joint programming, collaboration and cooperation within available resources. UNEP is also compiling experience on the more effective delivery of information to decision makers, and will share that experience through Earthwatch with all of its partners. Similarly, the experience acquired in the Global Resources Information Database (GRID) in the handling and integration of large environmental data sets is being shared to make better use of the large quantities of environmental information already available.

2. With respect to the need for operational early warning systems under Earthwatch, some components already exist and others are in preparation. FAO operates early warning systems for food security involving, inter alia, production, trade and consumption trends, as well as drought and migratory pests. WHO provides early warning of certain infectious diseases, and of the health implications of disasters, and has developed early warning strategies for water pollution monitoring under the Global Environment Monitoring System (GEMS)/Water programme. WMO has encouraged early warning systems for tropical cyclones in areas where they are a significant threat. The Department of Humanitarian Affairs of the United Nations Secretariat is preparing a humanitarian early warning system, and coordinates an inter-agency effort to provide early warning of new flows of refugees and displaced persons, and these activities could also become components of Development Watch. For longer-term early warning, the continuing observations being planned under the global observing systems for climate, oceans and the terrestrial environment, namely, the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS) and the Global Terrestrial Observing System (GTOS), should be able to detect significant trends in global change, hopefully in time for the international community to take preventive action. UNEP is organizing the means to look at the interactions among all these critical elements of the global system, where interlinkages and feedbacks are most likely to provide surprises. Adequate support to these long-term operational environmental measurements and assessments will be necessary if they are to fulfil their early warning potential.

3. The United Nations system-wide Earthwatch incorporates both the environmental observing, assessment and reporting activities of each specialized agency in its sectoral area, and a wide range of inter-agency programmes that demonstrate the increasing coordination and cooperation throughout the United Nations system. International scientific, non-governmental and governmental

organizations are often associated with these initiatives. Each participating organization is, within the limitations of available resources, strengthening its contributions to information for decision-making and improving its linkages with cooperating partners. UNEP is working with a group of leading research centres to develop tools such as computer models to integrate the many types of environmental and socio-economic data and eventually to prepare projections and scenarios that should help to give early warning of coming problems and provide decision makers with policy options for responding to them. Some of the principal agency and inter-agency elements supporting Earthwatch are listed in a back-of-the-room paper to be made available to the Commission.

4. Many of the partners in Earthwatch are developing indicators for measuring progress in their particular sectors and on priority issues. Earthwatch will work for the maximum harmonization of such indicators, as well as for coherent sets of national- and regional-level environmental indicators as a contribution to the corpus of sustainable development indicators. To support this, UNEP is planning an indicators network to facilitate information flow among those working in the field, and a database of indicators to help identify those appropriate for any particular use. The organizations cooperating in Earthwatch should also be able to help the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat in supporting national efforts to use indicators for policy-making and as guides to sustainability, as well as in reporting to the Commission on Sustainable Development.

5. Earthwatch is exploring the potential for using public participation in data-collection efforts, including proposals for an Earthwatch campaign to obtain a much more complete view of the state of the world in the year 2000. Such activities, if carefully planned to ensure scientific validity and proper quality control and assessment of the data collected, could involve schools, non-governmental organizations, the media and other groups in building a more complete picture of the status of species, land uses, development activities, pollution problems and the characteristics of the human and natural environment as inputs for the next UNEP "State of the World Environment" report and as a basis for selective continued monitoring of national and global trends. Such approaches have proved their worth in some countries, for instance by involving bird-watching groups in an annual census of bird populations. Initiatives to involve school classes in environmental monitoring will also be encouraged. Public participation will demonstrate to people that they can observe their own environment and draw their own conclusions about behaviour for or against sustainability, and will help them to understand the results of national and international public information efforts. Such programmes would require a major commitment on the part of United Nations organizations, Governments, non-governmental organizations, the media and even the private sector, but with potential benefits for all involved. This may be the only practical approach in the short term to closing the data gap in many developing countries.

6. One priority of Earthwatch is to work for a more rapid flow of information through the system and to target decision-making processes more directly, so that policy makers can receive more timely and appropriate information.

7. On the basis of the in-depth study of Earthwatch, the increased collaboration now established, and the results of the review of Chapter 40 by

the Commission on Sustainable Development and of Earthwatch by the Governing Council of UNEP, the critical needs with regard to implementing Earthwatch throughout the United Nations system in close cooperation with Governments are being defined. These will be costed and assembled into a coherent package of specific, well-targeted activities for presentation to an Agenda 21 round-table meeting of interested Governments and other donors as a further step towards the effective implementation of this important dimension of Agenda 21.